BRIEFER ARTICLES.

"Crazy" pollen of the bell-wort (with plate VI.)--The pollen of the great-flowered bell-wort (*Uvularia grandiflora* Sm.) is of good size, smooth coated, nearly colorless (yellow in mass) and in many ways well adapted for use in laboratory work with students. The two nuclei may be easily demonstrated by using methyl violet or methyl green. The best reagent, however, out of a large number employed, is azo-rubin when used in a very dilute solution. Picric acid brings out the smaller nucleus in a very satisfactory manner. The larger nucleus is nearly as long as the pollen grain (55μ–65μ) and usually occupies its center. The appearance of the pollen after treatment is shown in figures 14-17, plate VI. The larger nucleus is many times longer than broad, and somewhat bent and pointed at each end. The smaller nucleus is oval shaped and not more than one-eighth as large as the long nucleus. It occupies a nearly central position in the pollen grain,

These Uvularia pollen grains germinate quickly in a medium sugar solution and exhibit a fine circulation of protoplasm within the larger tubes. In germination a tube arises seemingly at any point upon the surface of the grain. It as frequently grows from the side as from the end, and occasionally there are two tubes from the same grain when growing under ordinary conditions (figures 14, 15 and 17). Large numbers of pollen grains were found with tubes a millimetre in length when first removed from the anthers. It was therefore not necessary to wait upon the cultures for a supply of germinating pollen. In the culture medium some tubes obtained a length of two millimetres in fifteen hours. In many instances the large nucleus was found in the tube, and in one case it was in the somewhat enlarged tips of the tube. A portion of the end of a pollen tube is shown in figure 18. The granular contents of the tubes were arranged in well-defined rows which occupied a somewhat spiral direction beneath the wall of the tube. The protoplasm in its motion observed the same direction, and reminded the observers of what is to be seen within the long cells of a Nitella. The granules could be followed to the enlarged tip of the tube, where they passed by the nucleus upon one side and turned and returned upon the opposite side. The cyclosis was quite rapid, and it is to be regretted that measurements of the movements of the granules were not recorded.

One of the culture slides lost a large part of the nourishing sugar solution by absorption into the pieces of surrounding blotting paper, and the pollen grains upon the under surface of the suspended glass cover produced tubes of very strange abnormal forms. The germination of a dozen such grains is shown in figures 1-13. These grains were selected from among hundreds of others as exhibiting the more extraordinary

forms. The original grain in each case is indicated by a darker or dotted shading, while the outgrowth is shown as a less colored portion. It will be seen at a glance that there was seemingly no "method in their madness." Some germinate from the side, others from the end, while others still send out tubes from both side and end. In some cases the remnant of the pollen grain is like a shell that is found upon the back of a snail, while the irregular growth of short tubes resembles the living portion of the snail. In some instances the pollen grain looked as if it had undergone a process similar to that of the popping open of a grain of corn. In others there was an amœba-like mass, projecting from one side of the grain, having not less than a dozen arms extending in as many directions. In one case there is shown a grain with a broad zigzag extending band, as if the point of growth had changed alternately from right to left as the tube increased in length. It is doubtless true that the projecting pollen tube in each of the abnormal cases met with more than usual resistance and the place of growth was shifted to another part of the tube. In this way, by the increase in size taking place at points of least resistance, each pollen grain built up a structure peculiar to itself, determined by its surroundings. It is not entirely unlike the formation of irregular, lifeless structures when liquids undergo solidification or even crystallization under unfavorable circumstances.

These unfortunate Uvularia pollen grains teach us of the persistency that is inherent in these highly vitalized cells. After successive failures to develop long tubes they still boldly attempted to send out new ones until they perished victims of adverse environments.—BYRON D. HALSTED

EDITORIAL.

IN THE SUBJECT of botany this seems to be an era of text-books and laboratory guides. Never before have so many authors essayed to satisfy the demands of the student and teacher, and never before have students and teachers looked so eagerly for some book to suit their needs. The harvest of books is large, but the quality is of all grades. The publication of worthless botanical text-books is often deprecated, but it is not a serious evil, except to the publishers. No text-book in these days can be otherwise than short-lived which does not "fill the want" it proposes to, and in no other department is the working of the law of natural selection more apparent than in that of text-books. There is a class of botanists who are never satisfied until they write a book. With no disposition to add something to the sum of botanical knowledge by patient work (they call it lack of opportunity), they conceive that the easiest thing to do is to grind over the knowledge of others and make a text-book. If there is anything that requires complete mastery of the subject of botany, a keen and critical judgment, a happy method of thought and expression, it is to write a text-book that will live. The young worker begins by readjusting clas-